COVER SHEET

RESPONSIBLE AGENCY: U.S. Department of Energy (DOE)

TITLE: Final Environmental Impact Statement: Accelerator Production of Tritium at the Savannah River Site (DOE/EIS-0270)

LOCATION: Aiken and Barnwell Counties, South Carolina

CONTACT: For additional information on this environmental impact statement, write or call:

Andrew R. Grainger, NEPA Compliance Officer
U.S. Department of Energy, Savannah River Operations Office
Building 742A, Room 122
Aiken, South Carolina 29802
Attention: Accelerator Production of Tritium EIS
Local and Nationwide Telephone: (800) 881-7292
E-mail: nepa@SRS.gov

The EIS is also available on the internet at: http://www.srs.gov/general/sci-tech/apt/index.htm and http://tis-nt.eh.doe.gov/nepa/docs/docs.htm

For general information on the DOE National Environmental Policy Act (NEPA) process, write or call:

Carol M. Borgstrom, Director
Office of NEPA Policy and Assistance, EH-42
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, D.C. 20585
Telephone: (202) 586-4600, or leave a message at (800) 472-2756

ABSTRACT: The action proposed in this environmental impact statement (EIS) is to construct and operate a linear accelerator that would produce tritium, which is a gaseous radioactive isotope of hydrogen essential to the operation of the weapons in the nation's nuclear arsenal. This EIS is tiered (linked) to the *Final Programmatic Environmental Impact Statement for Tritium Supply and Recycling* (DOE/EIS-0161; October 1995), from which DOE determined that it would produce tritium either in an accelerator as described in this EIS or in a commercial light-water reactor as described in *Production of Tritium in a Commercial Light Water Reactor* (CLWR) (DOE/EIS-0288). This EIS evaluates the alternatives for the siting, construction, and operation of an accelerator on the Savannah River Site and the impacts of those alternatives on the Site's physical and manmade environment, its human and biological environment, and the regional economic and social environment.

PUBLIC COMMENTS: In preparing the Draft EIS, DOE considered comments received by letter and voice mail, and comments given at public meetings in Savannah, Georgia and Aiken, South Carolina on December 3 and 5, 1996, respectively. [NOTE: These were joint meetings held by DOE to discuss the scopes of two related EISs: this one for the accelerator production of tritium and the EIS *Construction and Operation of a Tritium Extraction Facility at the Savannah River Site* (DOE/EIS-0271D). A summary of public comments was made available on April 28, 1997, and may be obtained by contacting Andrew R. Grainger as shown above.

A 45-day comment period on the Draft APT EIS began with publication of a Notice of Availability in the *Federal Register* on December 19, 1997. A public meeting to discuss and receive comments on the Draft EIS was held on January 13, 1998, at the North Augusta Community Center, 101 Brookside Drive, North Augusta, South Carolina. The Draft EIS public comment period ended February 2, 1998. Comments were submitted by voice, e-mail, and regular mail at the address provided above. All comments received were carefully considered in the preparation of this Final EIS.

Preface

The Tritium Supply and Recycling Final Programmatic Environmental Impact Statement (PEIS) (DOE/EIS-0161), which was completed in October 1995, assessed the potential environmental impacts of technology and siting alternatives for the production of tritium for national security purposes. On December 5, 1995, DOE issued a Record of Decision (ROD) for the Tritium Supply and Recycling PEIS that selected the two most promising alternative technologies for tritium production and established a dual-track strategy that would, within 3 years, select one of those technologies to become the primary tritium supply technology. The other technology, if feasible, would be developed as a backup tritium source. Under the dual-track strategy, DOE would: (1) initiate the purchase of an existing commercial reactor (operating or partially complete) or irradiation services with an option to purchase the reactor for conversion to a defense facility; and (2) design, build, and test critical components of an accelerator system for tritium production. Under the PEIS ROD, any new facilities that might be required, i.e., an accelerator and/or a Tritium Extraction Facility to support the commercial reactor alternative, would be constructed at DOE's Savannah River Site (SRS) in South Carolina.

The PEIS described a two-phase strategy for compliance with the National Environmental Policy Act (NEPA). The first phase included completion of the PEIS and subsequent ROD. The second phase included the preparation of site-specific NEPA documents tiered from the PEIS. These EISs address the environmental impacts of specific project proposals. As a result of the PEIS and the ROD, DOE determined to prepare three site specific EISs: the Accelerator Production of Tritium at the Savannah River Site (APT) (DOE/EIS-0270), the Production of Tritium in a Commercial Light Water Reactor (CLWR) (DOE/EIS-0288), and the Tritium Extraction Facility at Savannah River Site (TEF) (DOE/EIS-0271). Each of these EISs presents an analysis of alternatives which do not affect the alternatives in the other EISs with one exception. This exception is one alternative in the TEF EIS which would require the use of space in the APT. For this alternative to be viable, the APT would have to be selected as the primary source of tritium.

On December 22, 1998, Secretary of Energy Bill Richardson announced that commercial light water reactors (CLWR) will be the primary tritium supply technology. The Secretary designated the Watts Bar Unit 1 reactor near Spring City, Tennessee, and Sequoyah Unit 1 and 2 reactors near Soddy-Daisy, Tennessee as the preferred commercial light water reactors for tritium production. These reactors are operated by the Tennessee Valley Authority (TVA), an independent government agency. The Secretary designated the APT as the "backup" technology for tritium supply. As a backup, DOE will continue with developmental activities and preliminary design, but will not construct the accelerator. Finally, selection of the CLWR reaffirms the December 1995 Tritium Supply and Recycling PEIS ROD to construct and operate a new tritium extraction capability at the SRS.

DOE has completed the final EISs for the APT, CLWR, and TEF. No sooner than 30 days after publication in the Federal Register of the Environmental Protection Agency’s Notice of Availability of the final EISs for CLWR, APT, and TEF, DOE intends to issue a consolidated Record of Decision to: (1) formalize the programmatic announcement made on December 22, 1998; and (2) announce project-specific decisions for the three EISs. These decisions will include, for the selected CLWR technology, the selection of specific CLWRs to be used for tritium supply, and the location of a new tritium extraction capability at the SRS. For the backup APT technology, technical and siting decisions consistent with its backup role will be made.

SUMMARY

On September 5, 1996, the U.S. Department of Energy (DOE) published the "Notice of Intent to Prepare an Environmental Impact Statement for the Construction and Operation of an Accelerator for the Production of Tritium at the Savannah River Site" (61 FR 46787). As stated in the Notice of Intent, this EIS is to evaluate technology and site options for the use of an accelerator for the production of tritium (APT) and to assess the impacts of accelerator construction and operation at SRS.

The Notice of Availability for the Draft APT EIS was in the *Federal Register* on December 19, 1997. A 45-day public comment period began on that date and ended on February 2, 1998. A public meeting was held on January 13, 1998, at the North Augusta Community Center.

DOE is not reprinting a revised draft as the Final EIS, as is typically done. Rather, DOE is finalizing the APT EIS by reference to the Draft EIS and is issuing this document as a record of changes made pursuant to 40 CFR Part 1503.4.

The U.S. Department of Energy (DOE) is responsible for ensuring that the nation has a supply of materials for the operation of its stockpile of nuclear weapons -- even though a series of treaties has reduced that stockpile to a fraction of what it was during the Cold War. One of these materials is tritium, a gaseous isotope of hydrogen that increases the yield of nuclear weapons. None of the weapons in the nuclear arsenal would function as designed without tritium. As long as the United States chooses to maintain a nuclear deterrent -- of any size -- it will need tritium.

There are two issues related to the United States' need for tritium. The first is that the U.S. no longer has operating facilities to produce this material. DOE has shut down the reactors that irradiated the base material from which the gas was derived -- and will not restart them. The second issue is that tritium decays at a rate of about 5.5 percent per year. This means that present supplies will be cut nearly in half before 2010, and that the United States will essentially run out in about 2040. Therefore, the United States must have a new source of tritium.

For the past several years, DOE has been evaluating ways to produce tritium. Following the requirements of the National Environmental Policy Act (NEPA), the Department took its first step toward a solution when the *Final Programmatic Environmental Impact Statement for Tritium Supply and Recycling* (Tritium Supply PEIS) (DOE/EIS-0161, October 1995) evaluated both the need for a new tritium source and the alternatives to provide that source. Continuing the NEPA process, on December 12, 1995, DOE published a Record of Decision (ROD; 60 FR 63878) for the Tritium Supply PEIS in which it announced that it would pursue a dual-track approach to the two most promising alternatives:

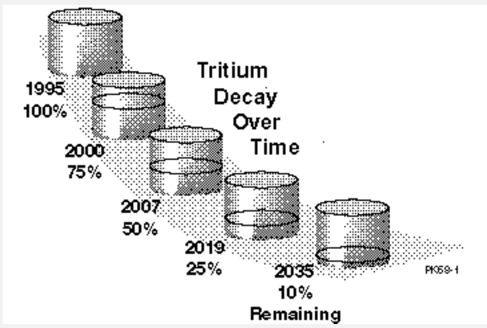
- To design, build, and test critical components of an accelerator system for tritium production

- To initiate the purchase of an existing commercial light-water reactor (operating or partially complete) for conversion to a defense facility, or the purchase of irradiation services with an option to purchase the reactor

In the 1995 ROD, DOE committed that by late 1998, it would select one of these approaches as the primary source of tritium. In addition, the Department would, if possible, continue to develop the other alternative as a backup tritium source. Further, the ROD announced DOE's selection of the Savannah River Site (SRS) in South Carolina as the location for an accelerator, if the Department decided to build one, and its decision to upgrade and consolidate the existing SRS tritium recycling facilities and to construct a Tritium Extraction Facility at the SRS to support either dual-track alternative.

WHAT IS TRITIUM?

Tritium is a radioactive isotope of hydrogen that occurs naturally in small quantities. It must be manmade to obtain useful quantities. It is an essential component of every warhead in the current U.S. nuclear weapons stockpile. These warheads depend on tritium so they can perform as designed. Tritium decays at about 5.5 percent per year and, therefore, requires periodic replacement.



DOE developed the following strategy for compliance with the NEPA process: (1) make decisions on the alternatives described and evaluated in the Tritium Supply PEIS, and (2) follow with site-specific assessments that implement those decisions. Thus, DOE is preparing three EISs tiered to the programmatic EIS: this EIS on the construction and operation of an Accelerator for the Production of Tritium (APT), an EIS on the construction and operation of a Tritium Extraction Facility at the SRS, and an EIS on the use of a Commercial Light-Water Reactor to produce tritium.

PUBLIC COMMENTS

During the 45-day public comment period, DOE received input in two public meeting sessions held on January 13, 1998 at the North Augusta Community Center, by telephone, by letter, and by electronic mail.

Each comment was carefully considered and responses to those comments can be found in Part B of the Final APT EIS. In some cases, the comments resulted in DOE making modifications to the Draft EIS.

Six individuals made public statements or comments at the two public meeting sessions. Additionally, the Department has received 7 letters from individuals and organizations and received comments from two individuals via DOE's telephone message line.

Comments ranged from expressions of support for the APT projects to comments concerning the use of non-renewable resources, waste production, worker safety and health, project cost, proliferation, and the use of American products and technical talent.

EVENTS SINCE THE DRAFT APT EIS

Since issuance of the Draft EIS in December 1997, several events have occurred and decisions have been made that influenced the preparation of the Final APT EIS. Two other draft EISs related to the tritium supply mission were issued, the Tritium Extraction Facility (TEF) EIS and the Commercial Light-Water Reactor (CLWR) EIS. These three documents are closely interrelated. The proposed action described in the CLWR EIS is now the "No-Action" alternative in this EIS. Conversely, the APT is the "No-Action" alternative in the CLWR EIS.

In August 1998, the Department decided to make its primary technology decision prior to issuing the Final EISs. On December 22, 1998, Secretary of Energy Bill Richardson announced that CLWRs would be the primary tritium supply technology. The Secretary designated the Watts Bar Unit 1 reactor near Spring City, Tennessee, and Sequoyah Unit 1 and 2 reactors near Soddy-Daisy, Tennessee as the preferred CLWRs for tritium production. The Secretary designated the APT as the backup technology for tritium supply. Selection of the CLWR option reaffirms the December 1995 Tritium Supply and Recycling PEIS ROD to construct and operate a new tritium extraction capability at the SRS. The preferred alternative is the No Action alternative, consistent with its role as the backup technology. Under No Action, DOE would complete key research and development milestones for the accelerator at SRS (but not construct the facility) with the following design and support features: klystron radiofrequency power tubes, the use of superconducting equipment, helium-3 feedstock material, and mechanical draft cooling towers with river water makeup.

FORMAT FOR THE FINAL APT EIS

The Department is not reprinting a revised draft as the Final EIS, as is typically done. Rather, DOE is finalizing the EIS by reference to the Draft EIS and is issuing this document as a record of changes made pursuant to 10 CFR Part 1503.4.

Modifications to the Draft EIS are presented in two ways: (1) complete sections, tables, and figures have been replaced or added with specific references to the Draft EIS and (2) text or elements of tables in the Draft EIS have been modified and shown as **bolded text**. The modifications were made for the following reasons:

- To incorporate responses to comments received during the public comment period
- To Update or clarify factual information presented in the Draft EIS
- To reflect the evolution of APT design work that has progressed since the Draft EIS was issued

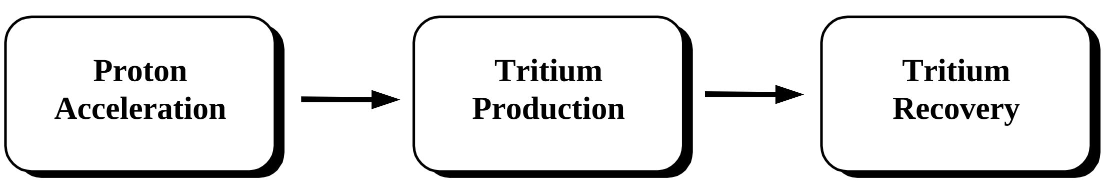
The Final EIS has four main parts. Part A is the introduction and describes the methodology used in preparing the document. Part B summarizes the comments received during the public comment period and provide responses to those comments. Part C presents the modifications to the Draft EIS (Chapters 1 to 7) as previously described. Part D focuses on the three design variations described later in this summary and provides this information as an addendum to Chapter 4 of the Draft EIS.

Table S-1 summarizes what modifications have been made to the Draft APT EIS. Exact locations in the Draft and Final for each modification are shown.

PURPOSE AND NEED FOR ACTION

The purpose and need for the Department's action is described in the *Final Programmatic Environmental Impact Statement for Tritium Supply and Recycling*. The Tritium Supply PEIS identified the 1994 Nuclear Weapons Stockpile Plan as the guidance document the Department must follow. Since the issuance of the Tritium Supply PEIS, the President has approved the 1996 Nuclear Weapons Stockpile Plan. The change between the two Nuclear Weapons Stockpile Plans was to change the projection of when a new tritium source is needed from approximately 2011 used in the PEIS to 2005. However, the need for tritium for the nuclear weapons stockpile, as discussed in the Tritium Supply PEIS, remains unchanged.

HOW DOES AN ACCELERATOR FOR TRITIUM PRODUCTION WORK?



Proton Acceleration:
- Uses linear accelerator
- Radiofrequency power provides energy for acceleration
- Room-temperature or superconducting operation

Tritium Production:
- Protons produce neutrons through spallation
- Neutrons are absorbed in feedstock material (Helium-3 or Lithium-6)

Tritium Recovery:
- Separate tritium from impurities
- Package and transport to Tritium Loading Facility

Table S-1. Modifications to Chapters 1 - 7 of the Draft APT EIS.

Sections of the Draft APT EIS Modified	Location in the Draft EIS	Location in the Final EIS	Link to comment (if applicable)	Subject of change
Chapter 1, Section 1.5	Page 1-5, 2nd column, 2nd through 4th paragraphs	Page C-1	L1-02	Tritium supply implementing strategy
	Page 1-6, 1st column, 1st through 2nd paragraphs	Page C-2		TEF No Action alternative
	Page 1-7, 1st column, after 2nd paragraph	Page C-2		Plutonium residues and scrub alloys management
	Page 1-7, 1st column after 2nd paragraph	Page C-3		Surplus plutonium disposition
Chapter 2, Section 2.1	Page 2-2, 1st column, 3rd through 4th paragraphs	Page C-3		APT No Action alternative
Chapter 2, Section 2.3.5	Page 2-15, 1st column, 1st and 2nd paragraphs	Page C-4	L2-04	APT site selection
Chapter 2, Section 2.5	Page 2-21, 2nd column through page 2-25, 2nd column, 3rd paragraph	Page C-5		APT design variations
Chapter 2, Section 2.7	Page 2-26, 1st column, 1st paragraph through 2-39	Page C-5		Comparison of environmental impacts
Chapter 3, Sections 3.3.1.1, 3.3.1.2, 3.4.2	Page 3-6, 1st column, 3rd paragraph and Figure 3-4 on page 3-7	Page C-26		APT footprint
	Page 3-8, 1st Column, 1st paragraph, 5th through 9th lines, Figure 3-5 on page 3-9, and Table 3-1 on page 3-10	Page C-26		APT footprint
	Page 3-44, 1st Column, 1st paragraph, lines 2 through 15, and Figures 3-16 and 3-17 on pages 3-47 and 3-48	Page C-26		Savannah River water quality
Chapter 3, Section 3.3.2.1	Page 3-18, 2nd column, 2nd paragraph and Table 3-5, page 3-21	Page C-33		Non-radiological air quality
Chapter 3, Section 3.3.4.1	Page 3-28, 2nd column, 2nd paragraph and Table 3-8, page 3-29	Page C-33		Radiological air quality
Chapter 3, Section 3.3.4.2	Page 3-28, 2nd column, 4th paragraph and Table 3-9, page 3-29	Page C-33		Radiation doses at SRS
Chapter 3, Section 3.4.1	Page 3-43, 1st column, 1st paragraph and Table 3-11, page 3-43	Page C-33		Radiation doses at SRS
Chapter 3, Section 3.4.5	Page 3-54, 2nd column, 2nd paragraph, line 8 through line 3 in the 1st column on page 3-55	Page C-36	L2-05 and L2-06	Threatened and endangered species
	Page 3-55, 1st column, 2nd paragraph	Page C-37	L2-05 and L2-06	Threatened and endangered species

Table S-1. (Continued).

Sections of the Draft APT EIS Modified	Location in the Draft EIS	Location in the Final EIS	Link to comment (if applicable)	Subject of change
Chapter 4	Page 4-1, 2nd column, 2nd and 3rd paragraphs	Page C-37		Concrete batch plants and construction debris landfill
	Page 4-2, 2nd column, 4th paragraph through page 4-3, 1st column, 1st paragraph	Page C-39		No Action impacts
Chapter 4, Section 4.1.1.2	Page 4-4, 2nd column, 4th paragraph through 1st paragraph on page 4-5	Page C-42	L4-03	Groundwater activation
Chapter 4, Section 4.1.2.1	Page 4-5, 2nd column, text box	Page C-43		Section 316(a) demonstration
Chapter 4, Section 4.1.2.2	Page 4-6, 2nd column, Tables 4-1 and 4-2, page 4-7	Page C-43		Water borne source terms
Chapter 4, Section 4.1.3.3	Page 4-16, 2nd column, 3rd paragraph and Table 4-11, page 4-18,	Page C-43		Maximum non-radiological concentrations
Chapter 4, Section 4.1.3.4	Page 4-19, 2nd column, 9th paragraph through page 4-22, 1st column, 4th paragraph, including Tables 4-12 and 4-13, pages 4-20 and 4-21	Page C-46		Accelerator source terms
Chapter 4, Section 4.1.4	Page 4-22, 2nd column, 3rd paragraph	Page C-48		Existing SRS River Water System
Chapter 4, Section 4.1.5	Page 4-25, 2nd column, text box	Page C-49	L3-05 and L4-04	APT waste categorization
	Page 4-25, 1st column, 1st paragraph and Tables 4-15 and 4-16, pages 4-26 and 4-27	Page C-49		APT waste generation estimates
Chapter 4, Section 4.1.5	Page 4-25, 2nd column, 4th paragraph through page 4-27, 1st column, 1st paragraph and Table 4-17, page 4-18	Page C-49		APT waste generation estimates
Chapter 4, Section 4.2.1.2	Page 4-36, 1st column, 4th paragraph and Table 4-22, page 4-37	Page C-49		Radioactive source terms
Chapter 4, Section 4.2.2.4	Page 4-56, 1st column, 3rd paragraph	Page C-51	L2-05 and L2-06	Threatened and endangered species
Chapter 4, Section 4.4.2.5	Page 4-74, 2nd column, 2nd paragraph, lines 16 through 28	Page C-53	L2-01 and L4-01	Coal-fired health risks
Chapter 5	Page 5-1, 1st column, 1st paragraph through page 5-2, 1st column	Page C-54		Cumulative impacts

Table S-1. (continued).

Sections of the Draft APT EIS Modified	Location in the Draft EIS	Location in the Final EIS	Link to comment (if applicable)	Subject of change
Chapter 5, Section 5.1	Page 5-2, 2nd column, 3rd and 4th paragraphs, and Table 5-1 on page 5-3	Page C-56		Radiological doses
Chapter 5, Section 5.2	Page 5-3, 2nd column, 1st paragraph and Table 5-2 on page 5-4	Page C-58		Non-radiological emissions
	Page 5-4, 1st column, sentences 1 and 2 and Table 5-3 on page 5-5	Page C-58		Radiological doses
	Page 5-4, 2nd column, after 1st paragraph	Page C-58	M1-03 and M1-10	Greenhouse effect
	Page 5-4, 2nd column, 2nd paragraph through page 5-6, 1st column, 1st paragraph and Table 5-4 on page 5-5	Page C-58		Cumulative waste volumes
Chapter 5, Section 5.4	Page 5-7, Table 5-5 and Table 5-5a added	Page C-61		Cumulative electricity generation
Chapter 5, Section 5.5	Page 5-9, Table 5-6	Page C-61		Cumulative health effects
Chapter 5, Section 5.7	Page 5-10, 1st column, 2nd paragraph through 2nd column, 2nd paragraph and Table 5-7 on page 5-11	Page C-64		Reasonably foreseeable actions
Chapter 6, Section 6.2	Page 6-2, 1st column, 2nd paragraph	Page C-64		Resource commitments
Chapter 7, Section 7.1	Page 7-6, 1st column, after 1st paragraph	Page C-66		SC solid waste Management act
Chapter 4, Sections 4.5.1, 4.5.2, 4.5.3, 4.6	Addendum	Page D-1		Design variations and mitigation actions
Miscellaneous modifications/additions to references				
Additions to Chapter 1 references	Page 1-10	Page C-66		
Additions to Chapter 2 references	Page 2-40	Page C-66		
Additions to Chapter 3 references	Page 3-65	Page C-66		
Additions to Chapter 4 references	Page 4-82	Page C-68		
Additions to Chapter 5 references	Page 5-12	Page C-69		

Table S-1. (continued).

Sections of the Draft APT EIS Modified	Location in the Draft EIS	Location in the Final EIS	Link to comment (if applicable)	Subject to change
Miscellaneous modifications/corrections				
Chapter 2, references	Page 2-40	Page C-69		
Chapter 3, references	Page 3-71	Page C-69		
Chapter 4, Section 4.1.1.1	Page 4-3	Page C-69		
Chapter 4, Section 4.1.5 references	Pages 4-23 through 4-29	Page C-69		
Chapter 4 Section 4.2.2.3	Page 4-54	Page C-69		
Chapter 4, references	Page 4-85	Page C-70		

PROPOSED ACTION AND ALTERNATIVES

DOE proposes to design, build, and operate a linear accelerator (linac) at the Savannah River Site. The Department will use the EIS and the NEPA process to inform decision makers and stakeholders about the potential environmental impacts of the proposed action and alternatives.

Preferred Alternative. Based on the research and development it has performed, DOE proposes the following preferred design and support features for the APT:

- Klystron radiofrequency power tubes
- Use of superconducting equipment
- Helium-3 feedstock material
- Mechanical-draft cooling towers with river water makeup
- Construction of the APT on a site 3 miles northeast of the Tritium Loading Facility
- Purchase of electricity from existing capacity through market transactions

No Action Alternative. In compliance with the regulations of the Council on Environmental Quality (CEQ) for implementing NEPA (40 CFR Part 1500-1508), this EIS also assesses a No Action alternative. If DOE chooses not to build and operate the APT, it would have to meet its tritium production requirements through other methods, or it would not be able to support the long-term defense policies of the United States, which is not acceptable. The No Action alternative for the proposed action in this EIS is to produce tritium in a commercial-light water reactor and to construct and operate a tritium extraction facility. Table S-2 compares the no-action impacts of APT, TEF, and CLWR.

Under the No Action alternative, SRS recycling and loading activities related to tritium would continue. Other actions determined in the Record of Decision for the Tritium Supply PEIS -- the potential modernization and consolidation of existing SRS tritium facilities -- would proceed as planned.

DESIGN FEATURES AND SYSTEM ALTERNATIVES

Radiofrequency Power Alternatives

APT would use radiofrequency waves to accelerate protons. Specially designed vacuum electron tubes would convert electric power to radiofrequency waves outside the accelerator beam, and waveguides (hollow metal conduits) would transmit them to cells along the beam path. The beam of electrically charged protons is affected by radiofrequency electric and magnetic fields. The accelerator design would enable the proton beam to intersect with the radiofrequency waves in the proper orientation to cause proton acceleration; in other words, the radiofrequency waves would push the protons down the beam tube faster and faster.

Two alternatives could supply radiofrequency power for the accelerator:

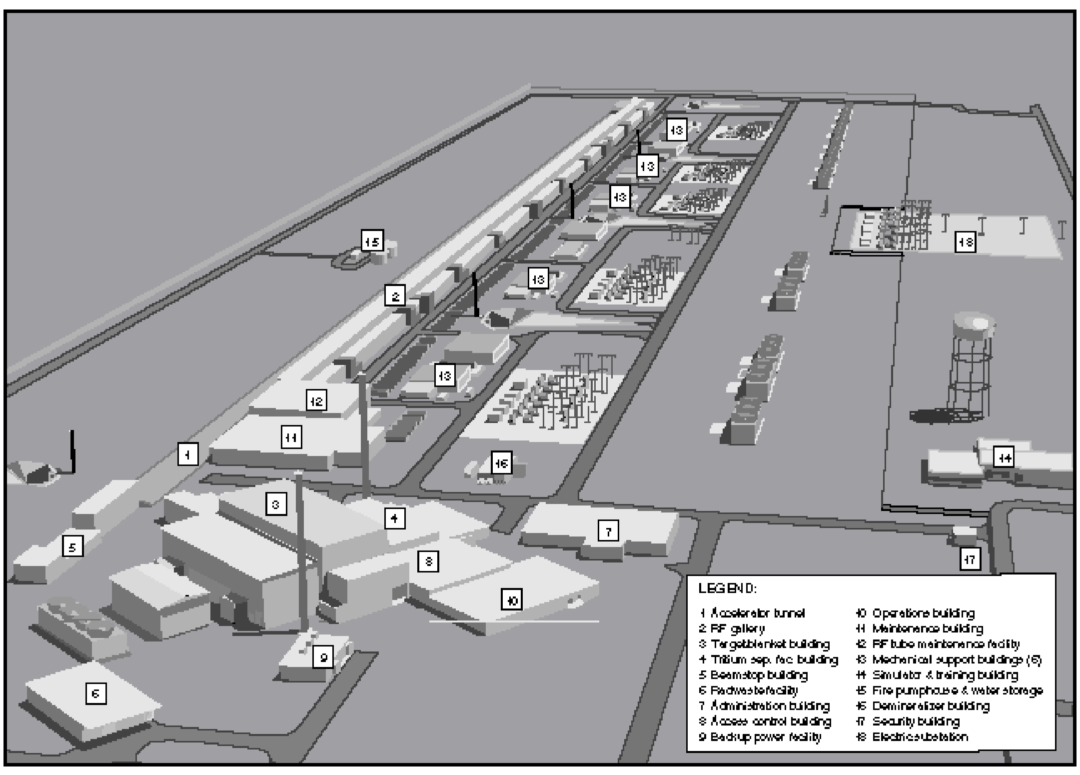
- Klystron radiofrequency power tubes (DOE's preference)

- Inductive output radiofrequency power tubes

Operating Temperature Alternatives

The operating temperature affects the electric components of an accelerator, depending on the type and intended use. Electrical resistance usually increases as temperature increases, causing the generation of more heat in the component and resulting in more electricity used. The converse is also true: electrical resistance usually decreases as temperature decreases, causing less heat generation and resulting in less electricity used. If the temperatures of some materials (e.g., niobium) fall to values very near absolute zero (-459°F), the electrical resistance becomes essentially zero, and the component uses much less electricity. This phenomenon is superconductivity.

WHAT WOULD A LINEAR ACCELERATOR FOR TRITIUM PRODUCTION LOOK LIKE?



There are two operating temperature alternatives for the design of the accelerator:

- Operating electric components at essentially room temperature
- Operating most components at superconducting temperatures and the rest at room temperature (DOE's preference)

Feedstock Material Alternatives

The accelerator would produce protons with an energy greater than 1,000 million electron Volts. To produce tritium, the protons would strike a target/blanket assembly of tungsten surrounded by lead. The high energy of the protons as they strike the tungsten atoms would cause a phenomenon called spallation in which the atoms would emit neutrons. The lead in the target/blanket would be an additional source of neutrons through more spallation events and other nuclear reactions. The neutrons freed during spallation would strike the feedstock material, and its atoms would absorb neutrons, resulting in the production of a tritium atom and a byproduct atom (feedstock dependent).

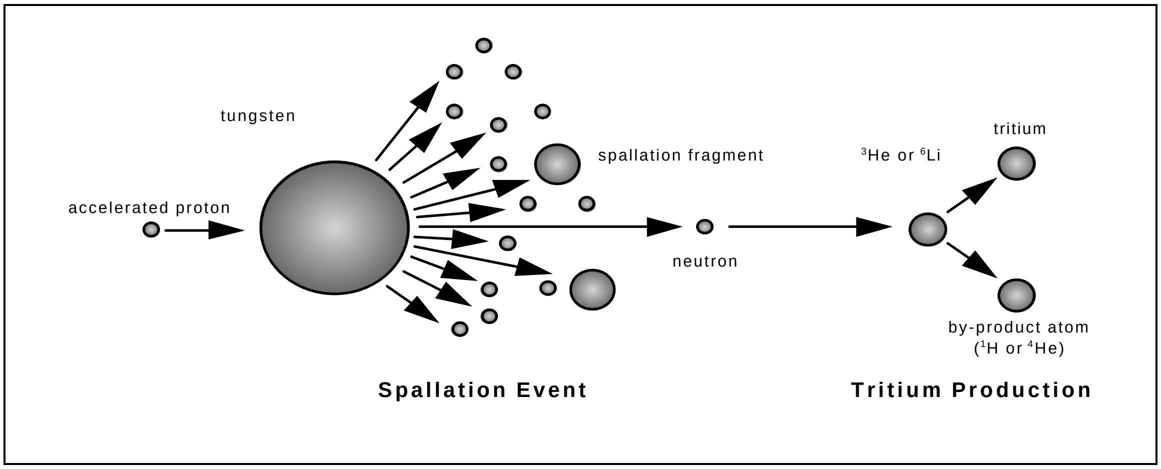
DOE could use the same target/blanket (lead and tungsten) as the neutron source regardless of the feedstock material. The Department has identified two feedstock materials that could produce tritium through the absorption of neutrons produced by spallation events:

- Helium-3 (DOE's preference)
- Lithium-6

Cooling Water System Alternatives

The equipment and activities in the APT would generate heat that would have to be removed to prevent the components from overheating. Air cooling would keep parts of the APT cool. Other areas would have high localized temperatures (e.g., the target and blanket regions due to the impingement of the proton beam on the target and the heat generated by spallation product absorption and radioactive decay in the target/blanket). Cooling water is required to keep the target/blanket components, radiation shielding, beamstops, and other components from overheating.

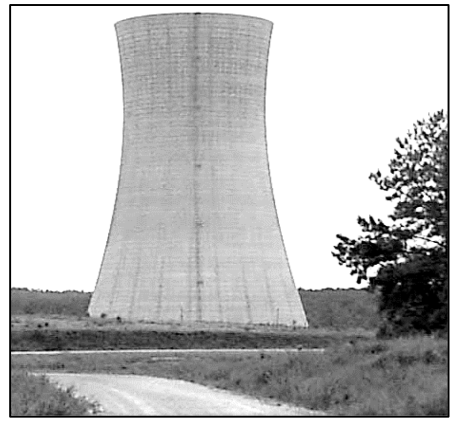
HOW DOES SPALLATION HAPPEN?



A pictorial representation of tritium production using neutrons generated by spallation. The proton strikes the target atom, which breaks into multiple fragments with the emission of neutrons. The neutrons then strike atoms (^{3}He or ^{6}Li), producing tritium and a byproduct atom (^{1}H or ^{4}He).

WHAT DO COOLING TOWERS LOOK LIKE?

Mechanical-Draft Cooling Tower



Natural-Draft Cooling Tower

Although these components would not necessarily all be connected to a single cooling system, DOE proposes to use a similar method -- a primary coolant loop isolated from the environment through heat exchangers -- to cool each component. The primary coolant loop would be the first system in contact with a component that required cooling, and heat would transfer from the component to the primary coolant loop. Components with the potential for radioactive contamination would require a secondary loop to cool the primary loop and isolate potential contamination from the environment. The final cooling for the systems, regardless of the number of cooling loops, would use a cooling water system to discharge heat to the environment.

Four cooling water system designs could provide the necessary cooling capacity for the APT:

- Mechanical-draft cooling towers with river water makeup (DOE's preference)
- Mechanical-draft cooling towers with groundwater makeup
- Once-through cooling using river water
- The existing K-Area cooling tower (i.e., natural draft) with river water makeup

APT Site Alternatives

DOE conducted a screening process to select potentially suitable sites for the APT. This multiple-phase process identified areas with a set of suitable features and minimal conflicts with onsite resources and operational areas.

Based on a weighing and balancing of the criteria, DOE selected two sites for further analysis:

- The preferred site 3 miles northeast of the Tritium Loading Facility, and approximately 6.5 miles from the SRS boundary
- The alternate site 2 miles northwest of the Tritium Loading Facility, and approximately 4 miles from the SRS boundary

Electric Power Supply Alternatives

The APT will require large amounts of electricity (a peak load as high as 600 megawatts-electric for the room temperature alternative) to operate. At present, the SRS obtains its electric power from South Carolina Electric and Gas Company (SCE&G) through existing transmission lines and substations. Both the preferred and alternate APT sites are close to existing electric power supply lines. Due to the projected magnitude of the electrical power usage; however, DOE is studying alternatives for the source of electricity for the APT, and has identified the following two:

- Obtain electricity from existing commercial capacity and through market transactions (DOE's preference)

- Obtain electricity from the construction and operation of a new coal-fired or a natural-gas-fired generating plant

APT Design Variations

There are three potential design variations which could enhance DOE's flexibility in supplying the nation's future tritium needs. The first is a modular, or staged, accelerator configuration. The second is combining tritium separation and tritium extraction facilities. The third is discharge of cooling water to an existing canal between Pond 5 and Pond C.

The modular design variation would use the same accelerator architecture as the baseline (linear) accelerator, but would be constructed in stages. In this EIS, the term "staged accelerator" refers to a design that would produce less tritium than the baseline APT, but would be capable of producing as much tritium as the baseline APT, with the addition of a second stage. The combined tritium separation and tritium extraction facilities would take advantage of common process systems and would be capable of handling both Helium-3 and Lithium-6 (CLWR or APT) feedstock material.

The third design variation would involve a new cooling system configuration. If this design variation were selected, the heated discharge water would be piped south from the APT facility to the head of Pond C (the canal entering Pond C) along existing roads and rights-of-way. This would prevent potential impacts to the biota of pre-cooler Ponds 2 and 5 because the heated water would bypass them. Impacts to the biota in Pond C would be less than those that would have occurred in Ponds 2 and 5 because the heated water would be entering a larger, deeper impoundment with more heat dissipating capacity.

The variations described in the EIS are based on the best information available. Based on current design information, DOE expects potential impacts of the design variations would vary little from those identified for the baseline accelerator.

AFFECTED ENVIRONMENT

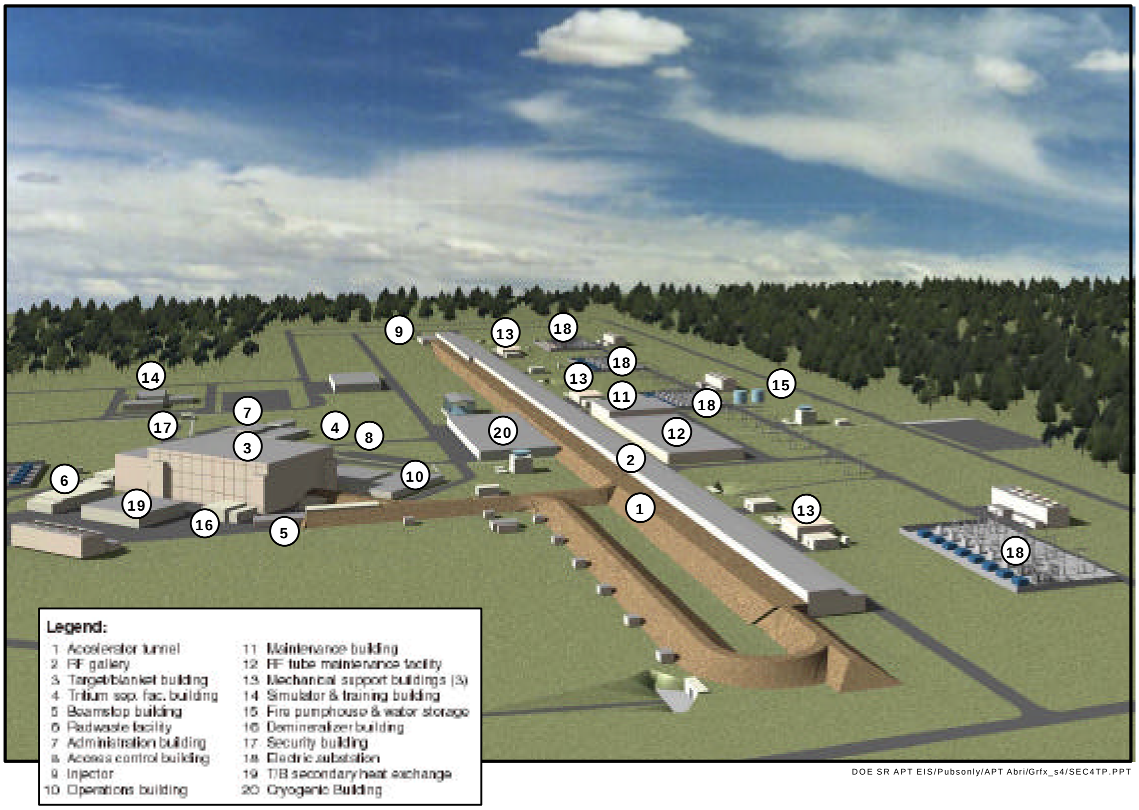
DOE would locate the APT on either the preferred or alternate site. Both sites are 250-acre forested tracts largely dominated by stands of loblolly and slash pine. No threatened or endangered species are known to exist at either site.

Most support activities not located at the APT site would be in M- or H-Areas. The following sections describe the proposed APT sites, M-Area, and H-Area.

APT Sites. As previously mentioned, DOE used a multiphase screening process to find suitable sites for the APT. This process identified areas with suitable features and minimal conflicts with onsite resources and operational areas.

The first phase involved the identification of land requirements based on the sizes of the proposed facilities. Next exclusionary criteria were developed to identify areas that could present operational or environmental conflicts with the APT (e.g., locations of threatened or endangered species or seismic faults). The third phase involved a more detailed comparison of potential sites, weighing and balancing the sites in four categories: ecology, geology and hydrology, human health, and engineering. DOE evaluated each site against the exclusionary criteria using either quantitative analyses or, if quantitative information was not available, the professional judgment of experts. The site screening process led DOE to the selection of the preferred and alternate sites.

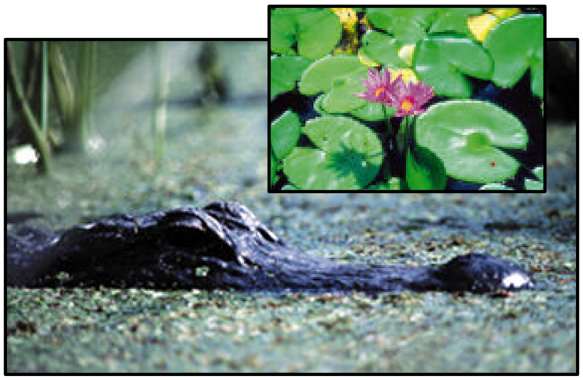
WHAT WOULD THE MODULAR ACCELERATOR FOR TRITIUM PRODUCTION LOOK LIKE?



DOE SR APT EIS/Pubsonly/APT Abri/Grfx_s4/SEC4TP.PPT

M-Area. M-Area, an industrialized area on the SRS, is the proposed host for a number of APT support functions. DOE has declared that several M-Area facilities are surplus and potentially available for new uses such as training, accelerator experimentation and testing. Historically, DOE used M-Area to fabricate fuel, special targets, and components for irradiation in the SRS production reactors. The facilities contained furnaces, extrusion presses, lathes, handling equipment, and storage racks for melting, casting, and shaping metal.

H-Area. H-Area also is an industrialized area. At present, the H-Area tritium facilities consist of four buildings, three of which have been part of the historic SRS tritium mission and are second-generation tritium structures. The fourth building, the Tritium Loading Facility (called the Replacement Tritium Facility during its construction and startup) is a third-generation facility that became operational in 1994. Operations in this building include unloading gases from reservoirs returned from the Department of Defense, separating and purifying useful hydrogen



isotopes, mixing the gases to exact specifications, and loading the reservoirs.

POTENTIAL ENVIRONMENTAL IMPACTS

The preferred technology alternatives, as previously described, were evaluated and compared to a suite of other technology components and design variations. Differences in impacts could occur if different technology alternatives or design variations are implemented. Based on current design information, the potential environmental impacts of the three design variations (the stage one modular APT, combining tritium extraction with the APT, and discharge to Pond C via a discharge canal) are bounded by the baseline APT. Table S-4 summarizes the impacts.

In general, DOE considers the expected impacts on the biological, human, and socioeconomic environment of construction and operation of an accelerator for production of tritium at the SRS to be minor and consistent with what might be expected for any industrial facility. Construction and operation of the Preferred alternative would result in the loss of about 250 acres of mixed pine/hardwood upland forest. Waste would be generated during both the construction and operation phases but in quantities that would have negligible impacts on SRS waste management facilities. No high-level waste or transuranic waste would be generated during construction or operation.

Some small impacts from discharge of cooling water to SRS streams and from nonradiological emissions to air and water would occur. Radiological releases during normal operation of the facility are expected to result in minor latent cancer fatalities in workers or the public. Because no high or adverse impacts are expected, no disproportionately high or adverse impacts on minority or low-income communities are expected.

Implementation of certain of the technology alternatives could result in impacts different from those resulting from construction and operation of the Preferred alternative. Most notable would be the impacts from implementation of cooling water system alternatives and electric power supply alternatives. Once-Through Cooling Using River Water would result in withdrawal from the Savannah River of about 125,000 gallons per minute of river water and discharge of hot water to the Par Pond system during operation. Thermal impacts would be restricted to the upper portions of the Par Pond system and would not affect Par Pond discharges to Lower Three Runs. There would be a small increase in Lower Three Runs flows, however. Bypassing precooler ponds 2 and 5 and discharging directly to Pond C via a discharge canal would eliminate the potential impacts to the precooler ponds. The implementation of the Mechanical-Draft Cooling Towers with Groundwater Makeup alternative would result in the withdrawal of 6,000 gallons per minute of groundwater. Total groundwater withdrawal at SRS could therefore exceed the estimated groundwater production capacity of the aquifer. This could affect groundwater flow to site streams.

The Preferred alternative includes buying electricity from the commercial grid to support APT operation. In the case of commercial electricity purchases, the environmental impacts attributed to the APT load would be decentralized. In the case of the construction of a new electricity generating plant to support the APT, the environmental impacts would be localized at the site selected for the plant. Construction and operation of such a facility could require about 290 acres for a coal-fired plant and about 110 acres for a gas-fired plant.

Under the No Action alternative, the Department would obtain required tritium from the irradiation of rods in a commercial light-water reactor. The potential impacts of utilizing a commercial light-water reactor are consistent with the operation of a reactor to generate electricity.

Because Secretary Richardson selected the CLWR as DOE's primary source for tritium, the tritium extraction facility will be constructed at SRS. In that its construction would either be at an existing facility near the SRS or in a currently industrial area of the SRS, construction impacts would be nominal. Likewise, operational impacts have been estimated to be small. APT will not be constructed at the preferred site and the land could be used for other missions. On-going SRS missions would continue. Incremental amounts of waste generation and electricity consumption that would have been attributable to the APT will not occur. Site employment will be a function of on-going missions and funding levels.

POTENTIAL MITIGATION ACTIONS

Once a primary technology decision has been made, specific mitigation measures that may be required will be identified in the Record of Decision and, if warranted, a mitigation action plan.

In general, the Department estimates the potential environmental impacts of the APT to be small. Two categories of potential impacts, however, are more notable than the others; the use of electricity and water. In the case of electricity use, preliminary discussions with the South Carolina Gas and Electric Company have indicated that it could provide sufficient electricity through wholesale agreements and consequently new generating capacity would not be required. Additionally, continuing design work is ongoing to add additional energy saving features to the APT design.

Water requirements for the APT are small in comparison to historic SRS usage. However, the withdrawal and discharge of water is a sensitive issue. DOE could mitigate the potential impacts to groundwater by using the Savannah River and mitigate the thermal discharge and flow impacts to Par Pond by utilizing cooling towers. As mentioned earlier, the Department is investigating bypassing precooler Ponds 2 and 5. This would eliminate the potential impacts to those water bodies.

Other potential mitigation actions could include:

- Incorporating engineered barriers into the APT design to minimize exposure to workers and the public
- Installing a system of monitoring wells
- Instituting best available engineering techniques to control erosion and sedimentation during the construction process
- Conducting site-specific reviews of utility corridors prior to construction to ensure the protection of sensitive plant and animal species and cultural resources
- Implementing any actions resulting from consultations with the U.S. Fish and Wildlife Service.

Table S-2. Comparison of No Action impacts.[a]

Potential impacts at the Savannah River Site		Potential impacts away from the Savannah River Site Commercial Light-Water Reactor		
APT Preferred alternative	TEF Preferred alternative **AND**	Bellefonte Nuclear Plant **OR**	Watts Bar Nuclear Plant **OR**	Sequoyah Nuclear Plant
Construction Impacts				
About 250 acres of land would be graded and leveled. Additional roads, bridge upgrades, rail lines and utility upgrades would be required. No geologically significant formations or soils occur. Dewatering would be necessary and could result in short-term increases in solids to receiving water bodies. No surface faulting on site. Air emission from fugitive dust, exhaust emissions, and batch plants would be negligible. Small construction landfill required. Most waste generated would be solid waste and sanitary waste. Increases in the work force for APT construction would not result in a boom situation. Peak employment would be about 1,400 jobs.	Construct facility in already industrialized H-Area. No geologically significant formations or soils occur. Dewatering would be necessary and could result in short-term increases in solids to receiving water bodies. No surface faulting on site. Air emission from fugitive dust, exhaust emissions, and batch plants would be negligible. Increases in the work force for TEF construction would not result in a boom situation. Peak employment would be about 740 jobs.	Activities would largely consist of internal modifications to existing structures. Spent fuel storage facilities would require about 5 acres of land and about 50 construction workers. Construction waste: Small amounts of hazardous and nonhazardous wastes generated; no change from EPA designation as small Quantity Generator. Direct and indirect construction jobs peak at 9,000 for Bellefonte 1 or Bellefonte 1 and 2, reducing the unemployment rate to about 3 percent from the current 7.9 percent.	No modifications or construction activities required. Spent fuel storage facilities same as Bellefonte and Sequoyah. Construction jobs for the spent storage facility: 50 Construction waste: None	Same as Watts Bar Spent fuel storage facilities same as Bellefonte and Watts Bar. Construction jobs for the spent storage facility: 50 Construction waste: None
Impacts from Operation on Nonradiological Air Emissions				
Nonradiological emissions would be well within the applicable regulatory standards. Operations would result in small amounts of salt deposition and plumes from cooling-tower operations. Plumes would be visible off-site under certain meteorological conditions.	Negligible impacts from nonradioactive airborne effluent.	Nonradiological emissions would be well within the applicable regulatory standards. Operations would result in small amounts of salt deposition and plumes from cooling-tower operations. Plumes would be visible off-site under certain meteorological conditions.	Nonradiological emissions would be well within the applicable regulatory standards. Operations would result in small amounts of salt deposition and plumes from cooling-tower operations. Plumes would be visible off-site under certain meteorological conditions.	Nonradiological emissions would be well within the applicable regulatory standards. Operations would result in small amounts of salt deposition and plumes from cooling-tower operations. Plumes would be visible off-site under certain meteorological conditions.

a. No Action includes TEF impacts at SRS and one or more reactor impacts away from SRS.

Table S-2. (Continued).

Potential impacts at the Savannah River Site		Potential impacts away from the Savannah River Site Commercial Light-Water Reactor		
APT Preferred alternative	TEF Preferred alternative **AND**	Bellefonte Nuclear Plant **OR**	Watts Bar Nuclear Plant **OR**	Sequoyah Nuclear Plant
Impacts from Operation on Radiological Air Emissions				
Negligible impacts from radioactive airborne effluents. Latent Cancer Fatalities (LCFs) expected: 0.0008	Negligible impacts from radioactive airborne effluents. Latent Cancer Fatalities (LCFs) expected: 0.00039	Negligible impacts from radioactive airborne effluents. Latent Cancer Fatalities (LCFs) expected: 0.0014	Negligible impacts from radioactive airborne effluents. Latent Cancer Fatalities (LCFs) expected: 0.0014	Negligible impacts from radioactive airborne effluents. Latent Cancer Fatalities (LCFs) expected: 0.0015
Impacts from Operation on Land Use and Infrastructure				
Land converted to industrial use. Electricity use: 3.1 terawatt-hrs/year	Land converted to industrial use. Electricity use: 0.021 terrawatt hrs/year	No land impacts. Electricity generation: approximately 1,300 MWe per Bellefonte reactor	No land use impacts. Electricity generation: approximately 1,300 MWe	No land use impacts. Electricity generation: approximately 1,300 MWe per Sequoyah reactor
Impacts from Operation on Waste Management				
Would generate solid and liquid wastes, but no high-level or transuranic waste; waste volumes would have negligible impact on capacities of waste facilities. Generation of electricity will generate various types of waste including fly ash, bottom ash, and scrubber sludge. Annual Values Sanitary solid: 1,800 metric tons Industrial: 3,800 metric tons Radioactive wastewater: 140,000 gallons Low-level radioactive waste: 1,400 cubic meters High concentration waste under evaluation: 12 cubic meters Sanitary wastewater: 3.2 million gallons Nonradioactive process wastewater: 920 million gallons	Would generate solid and liquid wastes, but no high-level or transuranic waste; waste volumes would have negligible impact on capacities of waste facilities. Annual Values Sanitary solid: 230 cubic meters Industrial: 33 cubic meters Low-level radioactive waste: 230 cubic meters Hazardous/mixed waste: 3.3 cubic meters Sanitary wastewater: 770,000 gallons Nonradioactive process wastewater: 11,000 gallons	Would generate solid and liquid wastes; waste volumes would have negligible impact on capacities of waste facilities. Annual Values Low-level radioactive waste: 40 cubic meters Mixed waste: <1 cubic meter Hazardous waste: 1.0 cubic meters Nonhazardous waste: 850,000 cubic meters 141 spent fuel assemblies per 18 month cycle	Would generate solid and liquid wastes; waste volumes would have negligible impact on capacities of waste facilities. Annual Values Low-level radioactive waste: 0.43 cubic meter No additional spent fuel if less than 2,000 TPBARs irradiated per 18 month cycle. Up to 60 additional spent fuel assemblies for 3,400 TPBARs per 18 month cycle.	Would generate solid and liquid wastes; waste volumes would have negligible impact on capacities of waste facilities. Annual Values Low-level radioactive waste: 0.43 cubic meter No additional spent fuel if less than 2,000 TPBARs irradiated per 18 month cycle. Up to 60 additional spent fuel assemblies for 3,400 TPBARs per 18 month cycle.

a. No Action includes TEF impacts at SRS and one or more reactor impacts away from SRS.

Table S-2. (Continued).

Potential impacts at the Savannah River Site		Potential impacts away from the Savannah River Site Commercial Light-Water Reactor		
APT Preferred alternative	TEF Preferred alternative **AND**	Bellefonte Nuclear Plant **OR**	Watts Bar Nuclear Plant **OR**	Sequoyah Nuclear Plant
Impacts from Operation on Human Health				
Public would receive radiation exposure from APT emissions and transportation of radioactive material; workers would receive radiation exposure from facility operations and transportation of radioactive material and from electromagnetic fields. Estimated fatal cancers: 0.0016	Public would receive radiation exposures from gaseous effluents. Estimated fatal cancers: 0.00039	Public would receive radiation exposures from gaseous and liquid effluents. Estimated fatal cancers: 0.0033	Public would receive radiation exposures from gaseous and liquid effluents. Estimated fatal cancers: 0.0032	Public would receive radiation exposures from gaseous and liquid effluents. Estimated fatal cancers: 0.0053
Impacts from Operation on Surface Water				
Blowdown rates (about 2,000 gpm) would cause negligible impact on surface water levels. Using Par Pond and pre-cooler ponds as discharge point for cooling water, temperatures would not exceed 90°F. Contaminated sediments would be resuspended in addition to radiological releases from APT. Estimated fatal cancers: 0.00021	Sanitary and industrial wastewater streams would be routed to existing SRS treatment facilities prior to release. Released water would be negligible compared to existing SRS releases.	Less than 1 percent of river flow. Water quality within regulatory limits. Public would receive radiation exposures from liquid effluents. Estimated fatal cancers: 0.0019	No change from existing operations. Public would receive radiation exposures from liquid effluents. Estimated fatal cancers: 0.0018	No change from existing operations. Public would receive radiation exposures from liquid effluents. Estimated fatal cancers: 0.0038
Impacts from Operation on Socioeconomics				
Operational work force about 500. No regional impacts.	Operational work force about 108. No regional impacts.	Operational work force: Operational work force about 800 for Bellefonte 1; about 1,000 for Bellefonte 1 and 2. Minor regional impacts.	Operational work force: 10 additional workers.	Operational work force: 10 additional workers.
Impacts from Transportation				
Negligible during operations period. During construction could expect about two fatalities to the public and workers due to increased traffic levels.	Vehicle emissions and less than one fatality per year. Routine and accidental doses.	Vehicle emissions and less than one fatality per year. Routine and accidental doses.	Same as for Bellefonte and Sequoyah.	Same as for Bellefonte and Watts Bar.

a. No Action includes TEF impacts at SRS and one or more reactor impacts away from SRS.

Table S-3. Comparison of impacts among APT alternatives.

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
Impacts from Construction on Landforms, Soils, Geology, and Hydrology								
Negligible impacts. Some 250 acres of land would be graded or leveled. No geologically significant formations or soils occur. Dewatering necessary. No surface faulting on site. Sites for electricity generation exist.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Water table is deeper and would require less dewatering; no other changes estimated from Preferred alternative.	Impacts would depend upon the specific location of a new facility. Could require about 110 acres for natural gas or 290 acres for coal.
Impacts from Operation on Landforms, Soils, Geology, and Hydrology								
No impacts No dewatering required for operations.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Removal of 6,000 gpm on a sustained basis could impact groundwater flow to streams and compact clay layers	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Impacts would depend upon the specific location of a new facility
Impacts from Construction on Surface Water								
Negligible impacts. Dewatering of construction site could result in short -term increases in solids to the receiving water bodies.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	**Discharges would be similar to the Preferred alternative, although they would go to Pen Branch via Indian Grave Branch. Water levels in the upper reaches of the**	No change estimated from Preferred alternative	Impacts would depend upon the specific location of a new facility

Table S-3. (Continued).

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
						stream system would be raised.		
Impacts from Operation on Surface Water								
Blowdown rates (about 2,000 gpm) would cause negligible impact on surface water levels. Using Par Pond and pre-cooler ponds as discharge point for cooling water, temperatures would not exceed 90°F. Contaminated sediments could be resuspended in addition to radiological releases from APT resulting in offsite population radiation exposure. Estimated fatal cancers: **0.00021**	Would require 7% less cooling water than Preferred due to lower waste heat generation; no other changes estimated from Preferred alternative	Would require 33% more cooling water than Preferred; no other changes from Preferred alternative	No change estimated from Preferred alternative	Blowdown rates (about 125,000 gpm) would result in higher temperatures to water bodies (about 100° F). A slight increase in "pre-cooler" pond water levels would occur. No other changes estimated from Preferred alternative.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Discharges would be similar to the Preferred alternative, although concentrations would vary and be localized.
Impacts from Construction on Nonradiological Air Emissions								
Air emissions (fugitive dust and exhaust emissions) would be negligible, well below the applicable regulatory standards. Impacts from electricity purchases, would be dispersed.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Emission types would be similar to the Preferred alternative, although concentrations would vary and be localized.

Table S-3. (Continued).

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
Impacts from Operation on Nonradiological Air Emissions								
Nonradiological emissions would be well within the applicable regulatory standards. Operations would result in small amounts of salt deposition and plumes from cooling-tower operations.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Nonradiological emissions would be well within applicable regulatory standards.
Impacts from Construction on Radiological Air Emissions								
No impacts; no radioactive materials stored during construction.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative
Impacts from Operation on Radiological Air Emissions								
Negligible impacts from radioactive airborne effluents Latent Cancer Fatalities (LCFs) expected: **0.0008**	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Slightly increased doses from airborne emissions LCFs expected: **0.00086**	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Higher doses from airborne emissions due to closer distance to SRS boundary. LCFs expected: **0.00089**	Impacts would depend upon the specific location of a new facility. However, the dose from radioactive effluents would be negligible.
Impacts from Construction on Land Use and Infrastructure								
Conversion of 250 acres of forested land to industrial use. Additional roads, bridge upgrades, rail lines and utility upgrades would be required.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Additional cooling water piping to K-area needed.	No change estimated from Preferred alternative	Impacts would depend upon the specific location of a new facility. Could require conversion of up to 290 acres to industrial use.

Table S-3. (Continued).

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
Impacts from Operation on Land Use and Infrastructure								
No land use changes beyond construction. Electricity use: 3.1 terawatt-hrs/year	No change estimated from Preferred alternative	No change estimated from Preferred alternative Electricity use 23% higher than Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative
Impacts from Construction on Waste Management								
Some landfill construction required. Most waste generated would be solid waste and sanitary solid and liquid waste. Waste disposed at SRS. (Annual Values) Sanitary solid: 560 cubic meters Construction debris: 30,000 cubic meters **Industrial wastewater: 3.6 million gallons**	No change estimated from Preferred alternative	9% **less sanitary** waste generated due to smaller construction workforce required.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Additional construction waste generated from construction of facility.
Impacts from Operation on Waste Management								
Would generate solid and liquid wastes, but no high-level or transuranic waste; waste volumes would have negligible impact on capacities of waste facilities.	No change estimated from Preferred alternative	37% more nonradioactive process wastewater required.	**8%** more low-level and **25%** more high concentration mixed waste generated than Preferred	2,000% greater flow of nonradioactive process wastewater required.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Impacts would depend upon the type of power plant selected. However, waste rates for new power plant would not be very different than for

Table S-3. (Continued).

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
Generation of electricity will generate various types of waste including fly ash, bottom ash, and scrubber sludge. (Annual Values) Sanitary solid: 1,800 metric tons Industrial: 3,800 metric tons Radioactive wastewater: 140,000 gallons High concentration low-level radioactive waste under evaluation: 2.5 cubic meters High concentration waste under evaluation: 12 cubic meters Sanitary wastewater: **3.3** million gallons Low-level radioactive waste: 1,400 cubic meters Nonradioactive process wastewater: 920 million gallons			alternative.					the Preferred alternative.

Table S-3. (Continued).

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
Impacts from Construction on Visual Resources								
Negligible, facilities far from SRS boundaries and not visible to offsite traffic; facilities would look like other industrial areas at SRS.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Impacts would depend upon the specific location of a new facility.
Impacts from Operation on Visual Resources								
Negligible, plumes from mechanical-draft cooling towers would be visible under certain meteorological conditions.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Negligible, would not generate visible plumes.	No change estimated from Preferred alternative	Plume from K-area cooling tower would likely be more visible.	No change estimated from Preferred alternative	Impacts would depend upon the specific location of a new facility.
Impacts from Construction on Noise								
Noise primarily from construction equipment at APT site. Not audible at SRS boundaries; however, construction workers could encounter noise levels that would require administrative controls or protective equipment.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Noise would be similar to Preferred alternative, but specific impacts would depend upon the location of a new facility.
Impacts from Operation on Noise								
Noise from APT equipment operation and traffic; mechanical-draft cooling towers largest single source, not audible at SRS boundary.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No mechanical - draft cooling tower noise at APT site. Pump noise could be occasionally audible to river traffic.	No change estimated from Preferred alternative	No mechanical-draft-cooling tower noise at APT site. Pump and cooling tower noise at K-area.	No change estimated from Preferred alternative	Noise would be similar to Preferred alternative, but specific impacts would depend upon the location of a new facility.

Table S-3. (Continued).

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
Impacts from Construction on Human Health								
Concentrations of nonradiological constituents would be less than applicable limits for workers and public. Traffic-related accidents resulting in about 2 fatalities to the public and workers due to increased local traffic would be reduced with finish of construction. Occupational injuries to workers would be due to industrial activities and would have the following impacts for the construction period: Number requiring First Aid: 1,100 Number requiring medical attention: 280 Number resulting in lost work time: 93	No change estimated from Preferred alternative	Occupational injuries 6% less than Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Traffic fatalities 20% less than Preferred alternative No changes in occupational injuries estimated from Preferred alternative	Impacts would be similar to Preferred alternative, but specific impacts would depend upon the location of a new facility.

Table S-3. (Continued).

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
Impacts from Operation on Human Health								
Public would receive source radiation exposure from APT emissions and transportation of radioactive material; workers would receive radiation exposure from facility operations and transportation of radioactive material and from electromagnetic fields. Total LCFs to population (air, water, and transport) **0.0016**	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Slightly increased doses from resuspension of contaminated material Total LCFs 0.0017	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Slightly increased doses due to decreased distance to public Total LCFs 0.0017	No change estimated from Preferred alternative. Impacts would be local vs. dispersed for electricity generation.
Impacts from Accidents on Human Health								
Negligible consequences for accidents with frequency of less than once in operating lifetime of facility.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Minor decreases in accident doses for low probability events.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	**No change estimated from Preferred alternative**
Impacts from Construction on Terrestrial Ecology								
Would result in the loss of up to 250 acres of forested land; no marked reduction in plant/animal abundance or diversity.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative; specific impacts would depend upon the location of a new facility.

Table S-3. (Continued).

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
Impacts from Operation on Terrestrial Ecology								
Negligible impacts. Mechanical-draft cooling towers would result in salt deposition on vegetation; however, maximum rates (60 lb/acres/yr) are below threshold levels (180 lb/acres/yr).	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	**No salt deposition, otherwise** no change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Specific impacts would depend upon the location of a new facility.
Impacts from Construction on Wetlands Ecology								
No impacts are projected from construction activities.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Specific impacts would depend upon the location of a new facility.
Impacts from Operation on Wetlands Ecology								
Would result in minor impacts to wetlands. Temperature of the blowdown would be marginally higher than the ambient maximum temperature. During cooler months the warmth could have a positive impact by lengthening the growing season for some aquatic vegetation.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Would raise water level in Ponds 2 and 5 by 1.5 feet, possibly affecting wetland plant communities.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Specific impacts would depend upon the location of a new facility.

Table S-3. (Continued).

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
Impacts from Construction on Aquatic Ecology								
Impacts to aquatic organisms in Upper Three Runs and tributaries would be minor due to use of soil and erosion control measures.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No changes estimated from Preferred alternative.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Specific impacts would depend upon the location of a new facility.
Impacts from Operation on Aquatic Ecology								
Impingement (132 fish) and entrainment (173,000 fish eggs and 326,000 larvae annually) would not substantially affect Savannah River fisheries. Solids in blowdown would have no impacts on aquatic ecology. Discharge temperatures would have only small localized effects on aquatic communities.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Impingement (2,600 fish) and entrainment (3.4 million fish eggs and 6.4 million larvae annually) would be increased. Discharge temperatures would be high enough to adversely affect aquatic communities.	**No impingement and entrain-ment, otherwise** no change estimated from Preferred alternative.	**Discharge to Pen Branch via Indian Grave Branch, otherwise** no change estimated from Preferred alternative.	No change estimated from Preferred alternative	Specific impacts would depend upon the location of a new facility.
Impacts from Construction on Threatened or Endangered Species								
Negligible, no threatened or endangered species at preferred site.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Negligible, no threatened or endangered species at alternate site.	Specific impacts would depend upon the location of a new facility.

Table S-3. (Continued).

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
Impacts from Operation on Threatened or Endangered Species								
Negligible impacts to threatened and endangered species.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Fish kills in pre-cooler ponds could be beneficial to bald eagles. Heated discharges could force alligators to leave pre-cooler ponds in late summer.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No threatened or endangered species at alternate site.	Impacts would depend upon the specific location.
Impacts from Construction on Socioeconomics								
Increases in the work force for APT construction would not result in large regional impacts. Nominal impacts would be positive. Peak employment is about 1,400 jobs.	No change estimated from Preferred alternative	Employment would be lower with about 100 fewer jobs	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Peak workforce would be about 1,100 additional jobs. Impacts would vary by location.
Impacts from Operations on Socioeconomics								
Operational work force about 500. Work force would not result in large regional impacts. Nominal impacts would be positive.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Additional operational workforce about 200. Impacts would vary by location.
Impacts from Construction on Environmental Justice								
No adverse impacts on minority or low-income populations expected.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Specific impacts would depend upon the location of a new facility.

Table S-3. (Continued).

Preferred alternative	Radio frequency power alternative	Operating temperature alternative	Feedstock material alternative	Cooling water system alternatives			Site location alternative	Electric power supply alternative
Described in text	**Inductive output tube**	**Room temperature**	**Lithium-6**	**Once-through using river water as makeup**	**Mechanical-draft using groundwater as makeup**	**K-Area cooling tower using river water as makeup**	**Alternate site**	**Construct new plant**
Impacts from Operations on Environmental Justice								
No adverse impact on minority or low-income populations expected.	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	No change estimated from Preferred alternative	Specific impacts would depend upon the location of a new facility.

Table S-4. Comparison of impacts among design variations.[a]

Preferred alternative (Baseline APT)	Modular APT (3 kg/year)	Modular APT (1030 MeV)	APT/TEF Combination	Cooling Water bypass Ponds 2 and 5
Impacts from Operation on Surface Water				
Blowdown rates (about 2,000 gpm) would cause negligible impact on surface water levels. Using Par Pond and the pre-cooler ponds as discharge point for cooling water, temperatures would not exceed 90°F. Contaminated sediments would be resuspended in addition to radiological releases from APT resulting in offsite population radiation exposure. Estimated fatal cancers: 0.00021	No change estimated from Baseline APT.	Blowdown rates would be 10 percent lower than the Baseline APT. Radiological releases would be the same as the Baseline APT.	No change estimated from Baseline APT.	No impact to Ponds 2 and 5.
Impacts from Operation on Nonradiological Air Emissions				
Nonradiological emissions would be well within the applicable regulatory standards. Operations would result in small amounts of salt deposition and plumes from cooling-tower operations.	No change estimated from Baseline APT.	Nonradiological releases would be 10 percent lower than the Baseline APT.	No change estimated from Baseline APT.	No change estimated from Baseline APT.
Impacts from Operation on Radiological Air Emissions				
Negligible impacts from radioactive airborne effluents. Latent Cancer Fatalities (LCFs) expected: 0.0008	No change estimated from Baseline APT.	No change estimated from Baseline APT.	Increased doses from airborne emissions. LCFs expected: 0.0009	No change estimated from Baseline APT.
Impacts from Operation on Land Use and Infrastructure				
No land use changes beyond construction. Electricity use: 3.1 terawatt-hrs/year	No change estimated from Baseline APT.	Electricity use would be 32 percent lower than the Baseline APT. Electricity use: 2.0 terawatt-hrs/ year	No change estimated from Baseline APT.	No change estimated from Baseline APT.

a. Table S-4 only summarizes the potential construction and operational impacts for those factors that could be different from what is described for the baseline accelerator.

Table S-4. (Continued).

Preferred alternative (Baseline APT)	Modular APT (3 kg/year)	Modular APT (1030 MeV)	APT/TEF Combination	Cooling Water bypass Ponds 2 and 5
Impacts from Construction on Waste Management				
Some landfill construction required. Most waste generated would be solid waste and sanitary solid and liquid waste. Waste disposed at SRS. <u>Annual Values</u> Sanitary solid: 560 cubic meters Construction debris: 30,000 cubic meters Industrial wastewater: 3.6 million gallons	No change estimated from Baseline APT.	Construction wastes would be 10 percent lower than the Baseline APT.	No change estimated from Baseline APT.	No change estimated from Baseline APT.
Impacts from Operation on Waste Management				
Would generate solid and liquid wastes, but no high-level or transuranic waste; waste volumes would have negligible impact on capacities of waste facilities. Generation of electricity will generate various types of waste including fly ash, bottom ash, and scrubber sludge. <u>Annual Values</u> Sanitary solid: 1,800 metric tons Industrial: 3,800 metric tons Radioactive wastewater: 140,000 gallons Low-level radioactive waste: 1,400 cubic meters High concentration low-level radioactive waste under evaluation: 2.5 cubic meters High concentration mixed waste under evaluation: 12 cubic meters Sanitary wastewater: 3.3 million gallons Nonradioactive process wastewater: 920 million gallons	No change estimated from Baseline APT.	Operations wastes would be 10 percent lower than the Baseline APT. <u>Annual Values</u> Radioactive wastewater: 130,000 gallons Low-level radioactive waste: 1,300 cubic meters Sanitary wastewater: 3 million gallons Nonradioactive process wastewater: 830 million gallons	Some waste categories slightly higher than Baseline APT. Differences from Baseline APT <u>Annual Values</u> Radioactive wastewater: 150,000 gallons Low-level radioactive waste: 1,700 cubic meters	No change estimated from Baseline APT.

a. Table S-4 only summarizes the potential construction and operational impacts for those factors that could be different from what is described for the baseline accelerator.

Table S-4. (Continued).

Preferred alternative (Baseline APT)	Modular APT (3 kg/year)	Modular APT (1030 MeV)	APT/TEF Combination	Cooling Water bypass Ponds 2 and 5
Impacts from Construction on Human Health				
Concentrations of nonradiological constituents would be less than applicable limits for workers and public. Traffic -related accidents resulting in about 2 fatalities to the public and workers due to increased local traffic would be reduced with finish of construction. Occupational injuries to workers would be due to industrial activities and would have the following impacts for the construction period: Number requiring First Aid: 1,100 Number requiring medical attention: 280 Number resulting in lost work time: 93	No change estimated from Baseline APT.	Construction health impacts would be 10 percent lower than the Baseline APT.	No change estimated from Baseline APT.	No change estimated from Baseline APT.
Impacts from Operation on Human Health				
Public would receive radiation exposure from APT emissions and transportation of radioactive material. Workers would receive radiation exposure from facility operations, transportation of radioactive material, and from electromagnetic fields. Total LCFs to population (air, water, and transport): 0.0016	No change estimated from Baseline APT.	No change estimated from Baseline APT.	Radiation exposures to the public would be 10 percent higher due to higher air emissions as compared to the Baseline APT. Total LCFs to population (air, water, and transport): 0.0017	No change estimated from Baseline APT.
Impacts from Operation on Wetlands Ecology				
Would result in minor impacts to wetlands. Temperature of the blowdown would be marginally higher than the ambient maximum temperature. During cooler months the warmth could have a positive impact by lengthening the growing season for some aquatic vegetation.	No change estimated from Baseline APT.	No change estimated from Baseline APT.	No change estimated from Baseline APT.	No heated blowdown to Ponds 2 or 5. Minor impact for heated water only in Pond C.

a. Table S-4 only summarizes the potential construction and operational impacts for those factors that could be different from what is described for the baseline accelerator.

Table S-4. (Continued).

Preferred alternative (Baseline APT)	Modular APT (3 kg/year)	Modular APT (1030 MeV)	APT/TEF Combination	Cooling Water bypass Ponds 2 and 5
Impacts from Construction on Socioeconomics				
Increases in the work force for APT construction would not result in a boom situation. Peak employment is about 1,400 jobs.	No change estimated from Baseline APT.	Peak employment would be 10 percent lower than the Baseline APT.	No change estimated from Baseline APT.	No change estimated from Baseline APT.

a. Table S-4 only summarizes the potential construction and operational impacts for those factors that could be different from what is described for the baseline accelerator.